PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB2005/001197	24.03.2005	02.04.2004

International Patent Classification (IPC) or both national classification and IPC
C07K14/47, C12N15/12, C12Q1/68, G01N33/68, A61P35/00, A61K31/713, A61K38/17, A61K39/00

Applicant
THE NOTTINGHAM TRENT UNIVERSITY

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:

European Patent Office - P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk - Pays Bas
Tel. +31 70 340 - 2040 Tx: 31 651 epo nl
Fax: +31 70 340 - 3016

Authorized Officer

Wiame, I

Telephone No. +31 70 340-8956

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/GB2005/001197

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☒ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☒ in written format

   ☒ in computer readable form

   c. time of filing/furnishing:

   ☒ contained in the international application as filed.

   ☒ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos. 20-24 (in respect of industrial applicability)

because:

☒ the said international application, or the said claims Nos. 20-24 (in respect of industrial applicability) relate to the following subject matter which does not require an international preliminary examination *(specify)*:

see separate sheet

☐ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. are so unclear that no meaningful opinion could be formed *(specify)*:

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the whole application or for said claims Nos.

☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:

the written form
- ☐ has not been furnished
- ☐ does not comply with the standard

the computer readable form
- ☐ has not been furnished
- ☐ does not comply with the standard

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions.

☐ See separate sheet for further details

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	18,24
	No:	Claims	1-17,19-23,25-27
Inventive step (IS)	Yes:	Claims	18,24
	No:	Claims	1-17,19-23,25-27
Industrial applicability (IA)	Yes:	Claims	1-19,25-27
	No:	Claims	

2. Citations and explanations

see separate sheet

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

Claims 20-24 relate to subject-matter considered by this Authority to be covered by the provisions of Rule 67.1(iv) PCT. Consequently, no opinion will be formulated with respect to the industrial applicability of the subject-matter of these claims (Article 34(4)(a)(i) PCT).

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: WO 01/53312 A (HYSEQ, INC; TANG, Y., TOM; LIU, CHENGHUA; ASUNDI, VINOD; CHEN, RUI-HON) 26 July 2001 (2001-07-26)

D2: DATABASE EMBL [Online] 24 March 2003 (2003-03-24), "Homo sapiens sarcoma antigen NY-SAR-27 mRNA, partial CDs." XP002336240 retrieved from EBI accession no. EM_PRO:AY211915 Database accession no. AY211915

D3: -& LEE SANG-YULL ET AL: "Immunomic analysis of human sarcoma." PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA, vol. 100, March 2003, pages 2651-2656, XP002336236

D4: -& LEE SANG-YULL ET AL: "Immunomic analysis of human sarcoma." INTERNET ARTICLE,Supporting information. Table 3, March 2003, XP002336237

1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1-17, 19-23 and 25-27 is not new in the sense of Article 33(2) PCT.

1.1 The document D1 discloses (the references in parentheses applying to this document):
- a polypeptide (SEQ ID NO:3186) which is 100% identical, from residue 143-491, to

the polypeptide referred to in the present application as SEQ ID NO:1, over its entire length, and which is expressed *inter alia* in testes and tumor lung, but not in adult and fetal lung or in lung fibroblast (table 1, pages 112, 116, 123, 132 and 133);
- a polynucleotide (SEQ ID NO:1400), encoding said polypeptide (p. 293) which is 100% identical, from position 623-1672, to the polynucleotide referred to in the present application as SEQ ID NO:3, over its entire length;
- a vector comprising said polynucleotide and a host cell comprising said vector (claim 6 and p. 24-27); and
- a monoclonal antibody specifically binding to said polypeptide (p. 76-78);
- use of said polynucleotide, polypeptide and antibody for detection, treatment or prophylaxis of lung cancer (p. 52-54, p. 62-74 and p. 87-88).

The subject-matter of claims 1-17, 19-23 and 25-27 is therefore not new (Article 33(2) PCT).

1.2 The document D2 discloses (the references in parentheses applying to this document):
- a polypeptide NY-SAR-27 which is 100% identical, from residue 4-148, to the polypeptide referred to in the present application as SEQ ID NO:1, from residue 205-349; and
- a polynucleotide, encoding said polypeptide which is 100% identical, from position 9-447, to the polynucleotide referred to in the present application as SEQ ID NO:3, from position 612-1050.

The subject-matter of claims 1, 4-7 and 9 is therefore not new (Article 33(2) PCT).

2 The present application meets the criteria of Article 33(1) PCT, because the subject-matter of claims 18 and 24 involves an inventive step in the sense of Article 33(3) PCT.

2.1 The document D3 is regarded as being the closest prior art to the subject-matter of claims 18 and 24 and discloses 113 sarcoma/ testes antigens identified by SEREX (abstract and see also document D4 which discloses Table 3 of document D3),

including the NY-SAR-27 polypeptide of document D2 (see 1.2 above). Sarcoma/testes or cancer/testes (CT) antigens are the products of transcripts present only in developing germ cells and human cancers of diverse origins and CT antigens are potential targets for vaccine-based immunotherapies (D3, p. 2651, par. 2). The NY-SAR-27 polypeptide has not been further characterized with respect to its expression in specific cancer types.

2.2 The subject-matter of claims 18 and 24 therefore differs from the subject-matter of document D3 in that the expression of NY-SAR-27 in specific cancer types has been determined.

2.3 The problem to be solved by the present invention may therefore be regarded as to determine the expression of NY-SAR-27 in specific cancer types and to provide related uses thereto.

2.4 The solution proposed in claims 18 and 24 of the present application can be considered as involving an inventive step (Article 33(3) PCT) for the following reasons.

NY-SAR-27 is isolated from a synovial sarcoma cell line (D4 and D3, p. 2651, "Cell Lines, Tissues, Sera and RNA"). However, there are no pointers in document D3 to the specific cancer types NY-SAR-27 could be expressed in.

Document D1 describes a polypeptide comprising most of NY-SAR-27 which is expressed *inter alia* in testes and tumor lung, but not in adult and fetal lung or in lung fibroblast (see 1.1 above). Thus by combining documents D3 and D1 the skilled person would provide methods of diagnosis and treatment of lung cancer using NY-SAR-27. Therefore an inventive step would be required to use NY-SAR-27 for the treatment and diagnosis of gastro-intestinal cancer, kidney cancer or prostate cancer.

3 For the assessment of the present claims 20-24 on the question whether they are industrially applicable, no unified criteria exist in the PCT Contracting States. The patentability can also be dependent upon the formulation of the claims. The EPO, for

example, does not recognize as industrially applicable the subject-matter of claims to the use of a compound in medical treatment, but may allow, however, claims to a known compound for first use in medical treatment and the use of such a compound for the manufacture of a medicament for a new medical treatment.

4 Further remarks

4.1 Claims 1-4 and 7-9 relate to an extremely large number of possible polynucleotides and polypeptides. Therefore said claims lack clarity within the meaning of Article 6 PCT.

4.2 The term "specifically hybridises to" used in claim 1 is unclear and leaves the reader in doubt as to the meaning of the technical features to which it refers, thereby rendering the definition of the subject-matter of said claim unclear (Article 6 PCT).

4.3 The term "derivative" used in claim 9 is unclear and leaves the reader in doubt as to the meaning of the technical features to which it refers, thereby rendering the definition of the subject-matter of said claim unclear (Article 6 PCT).

4.4 Claim 3 is not clear (Article 6 PCT) because it describes the nucleic acid molecule as being 80% homologous to another nucleic acid molecule. However, homology is a qualitative feature rather than a quantitative feature. It is therefore advisable to use the quantitative term identity instead.

4.5 Claim 2 refers to itself instead of to claim 1.

4.6 In claim 12, the use of the nucleic acid molecule is not further specified.

4.7 The claim following claim 3 is claim 14 instead of claim 4.